

REMARKS

Claims 1-7 are rejected.

Claims 1, 2, 3, 6 and 7 have been canceled.

Claims 4 and 5 have been amended.

New claims 8 and 9 have been added.

No new matter is added.

Claims 4, 5, 8 and 9 remain in the case for consideration.

Applicant requests reconsideration and allowance of the claims in light of the above amendments and following remarks.

Claim Objections

Claim 6 is objected to because of an informality. Claim 6 has been canceled.

Claim Rejection - 35 U.S.C. §112

Claim 2 is rejected as being indefinite. Claim 2 has been canceled.

Claim Rejections - 35 U.S.C. §102

Claims 1 and 7 are rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,088,039 issued to Kugimiya, et al. (hereinafter “Kugimiya”). Claims 1 and 7 have been canceled.

Claim Rejections - 35 U.S.C. §103

Claim 6 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Kugimiya. Claim 6 has been canceled.

Claims 2-5 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Kugimiya in view of U.S. Patent No. 6,278,967 issued to Akers, et al. (hereinafter “Akers”). Claims 2-3 have been canceled. Claims 4-5 have been amended.

New Claims 8 and 9 have been added.

Kugimiya and Akers are not directed toward general parsing methods

The purpose of the claimed invention is to develop an intelligent information retrieval system by means of general parsing method. In the claimed invention, semantic information is used to check if a local constituent structure formed by grammatical rules matches with any syntactic category predefined in the subcategorization frames stored in the subcategorization database. In contrast, Kugimiya and Akers are directed toward automated translation systems. Kugimiya and Akers use semantic information to determine appropriate translated words. These goals are different, and are achieved via different techniques.

Kugimiya and Akers do not teach analyzing and storing grammatical relationships

The claimed invention analyses and stores the grammatical relationships of an input sentence for intelligent information retrieval. For example, the grammatical relations in the sample sentence like ‘John invited a member of the circle’ includes the following grammatical relations; ‘John’ is the subject of the verb ‘invited’, ‘a member of the circle’ is the object of ‘invited’, ‘member’ is the head of modifying prepositional phrase ‘of the circle’, and the like. When these grammatical relations are properly analyzed and stored in the sentence information database, the sentence can be effectively and correctly retrieved to respond to input questions such as ‘Whom did John invite?’ or ‘Who invited a member of the circle?’, because ‘whom did John invite’ matches with the sample sentence with respect to subject-verb relation. And ‘Who invited a member of the circle’ matches with the sample sentence with respect to verb-object relation. And the same logic goes parallel with the rest grammatical relations found in natural language sentences. Neither Kugimiya nor Akers teach anything akin to this concept.

Kugimiya and Akers do not form constituent structures

The claimed invention adapts the mobile configuration concept so that it can easily accommodate a wide variety of ordering variations of immediate constituents of a sentence across natural languages. For example, the Korean language shows no restriction on the order of immediate constituents of a sentence when a verb comes at the

last of the sentence. Thus all of the following sentence tokens a-f carry the same meaning;

a. 철수-가 영희-에게 책-을 주-었-다.

Chulsoo-SM Yonghee-IOM book-DM give-Past-Declarative

(where SM = subject marker, IOM = indirect object marker, DM = direct object marker)

b. 철수-가 책-을 영희-에게 주었다.

c. 책-을 철수-가 영희-에게 주었다.

d. 책-을 영희-에게 철수-가 주었다.

e. 영희-에게 철수-가 책-을 주었다.

f. 영희-에게 책-을 철수-가 주었다.

It is practically impossible and meaningless to check the grammatical roles of the immediate constituents in varying positions in terms of a prevalent phrase structure configuration, as would be performed using Kugimiya and Akers. In contrast, the claimed method forms constituent structures by means of grammatical rules, and checks the grammatical roles by comparing the information predefined in the subcategorization frame. Thus, the invention obtains robust and consistent parsing, which is not possible using Kugimiya and Akers.

Kugimiya and Akers do not allow for repairing parsing errors

The method proposed in the invention allows easy repairing of parsing errors and expanding coverage of data. For example suppose that the following phrase structure rules are postulated in Kugimiya and Akers to parse the sample sentence “The man hit the girl.”:

Rules:

- a. S -> NP VP
- b. VP -> V NP
- c. NP -> Det N

When the sample sentence is changed to “The man almost hit the girl”, the new constituent “almost” has been added. To properly handle the new sample sentence, Kugimiya and Akers have to add the following two new rules to handle the new sample sentence:

- d. AdvP -> adverb
- e. VP' -> AdvP VP

In contrast, to be able to handle the new sample sentence, the claimed invention only needs to add a new category to the subcategory frame.

The Examiner refers to Akers, column 6, lines 27-28 as teaching the rule ‘VP -> V NP PP’. But this rule is simply a rule of multiple branches, and not an example mobile configuration because the order of the subcategories of VP (that is, V, NP, and PP) is fixed. Thus this rule is not equivalent to the corresponding mobile configuration of the claimed invention.

Kugimiya and Akers do not teach subcategorization including a subject constituent

In the prior art methods such as Kugimiya and Akers, subcategorization refers to the bare list of syntactic categories of complements headed by a verb. There is no subject constituent in the subcategorization.

In contrast, subcategorization in the claimed invention includes subject constituent, as well as all the other immediate constituents. Subcategorization also includes adjunct type information compatible with a given head, all of which are specified with the appropriate grammatical roles and object classes in terms of semantic features. Kugimiya and Akers do not teach these features.

Adverb phrases are not equivalent to multiple morpheme forms

The Examiner seems to consider adverb phrases between two commas as in Kugimiya to be equivalent to the multiple morpheme forms in the claimed invention. The adverb phrases of Kugimiya are syntactic constructions. This means that the meaning of each word in the multiple morpheme list in Kugimiya is maintained and

directly reflected in the whole construction. As they are syntactic in nature, the multiple morpheme list may grow very large. For example, ‘if any’ can be replaced with ‘when necessary’, ‘if possible’, ‘if appropriate’, and so on; all these variations need to be included in the multiple morpheme list, to allow for alternative phrases with identical meaning.

In contrast, the multiple morpheme forms of the claimed invention are not syntactic constructions at all. They are sequences of words that can function like a single word. For example, in the sentence below the sequence ‘in order that’ works like a subordinator as in the following data:

He worked very hard in order that he should pass the test.

그는 시험에 불으려고 열심히 공부하-였-다.

He-Top test-Loc pass-Purposive ending hard work-Past-Declarative
‘in order that’ in the English sentence corresponds to the verbal ending ‘으려고’ in the Korean sentence.

The strategy in Kugimiya is to temporarily delete the so-called multiple morphemes, while that in the invention is to reduce them into a word and assign a tag. The invention is also different from that of Akers in that in Akers multi-word entries are marked not to be construed as a specified part of speech. In contrast, the claimed invention uses multiple morpheme list to reduce the complexity of syntactic structure and ultimately reduce the complexity of parsing results.

CONCLUSION

For at least the foregoing reasons, reconsideration and allowance of all pending claims of the application as amended is requested.

The Examiner is encouraged to telephone the undersigned at (503) 222-3613 if it appears that an interview would be helpful in advancing the case.

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